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CROPS RESEARCH

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WINTER SURVIVAL OF FALL-SOWN OATS: SUMMARY DATA OBTAINED IN UNIFORM WINTER HARDINESS NURSERIES FROM 1926-62, INCLUSIVE 1/

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The uniform fall-sown winter hardiness nursery project was started in the Southern United States in 1926. In the first year there were 16 entries, and data were obtained from 7 stations in 5 States: 1 each in Arkansas, Mississippi, and South Carolina and 2 each in Georgia and Virginia. During the 36-year period, 1926-62, there have been 342 entries, and, as indicated in table 1, data were obtained from 114 stations in 29 States and from 5 points in 2 Canadian Provinces.

During the 36-year period, processed annual reports have been supplied to the cooperators and periodically more formal reports have been made.3/ The present publication is a compilation of these reports and is the first attempt to supply in summary form the data obtained to date.

1/ Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, in cooperation with the State agricultural experiment stations listed in table 1.

2/ Formerly principal agronomist, Crops Research Division, Agricultural Research Service.

3/ Coffman, F. A. The comparative winter hardiness of oat varieties. U.S. Dept. Agr. Cir. 622. 1941.

Coffman, F. A. Survival of oats grown in Winterhardiness Nurseries, 1937-1941. Jour. Amer. Soc. Agron. 34: 651-658. 1942.

Coffman, F. A. Results from Uniform Winterhardiness Nurseries in oats grown from 1942-1946. Jour. Amer. Soc. Agron. 39: 1027-1035. 1947.

Coffman, F. A. Results from Uniform Winter Hardiness Nurseries of oats for the five years, 1947-1951, inclusive. Agron. Jour. 47: 54-57. 1955.

Coffman, F. A. Winter oats extended northward by breeding and testing. Agron. Jour. 49: 187-189. 1957.

Coffman, F. A. Increased winter hardiness in oats now available. Agron. Jour. 54: 489-491. 1962.

Agricultural Research Service
U.S. DEPARTMENT OF AGRICULTURE

Experiments Conducted

In 1926, Winter Turf was considered America's most winter-hardy variety. It was used as the check for measuring the comparative survival percentages of all entries in all years.

During the 36-year period usable reports were received from 1,234 nurseries in the United States and from 15 in Canada. These reports indicated that killing was complete in 95 nurseries, all entries survived 100 percent in 287 nurseries, and killing was of a differential nature in 867 nurseries.

During the 36-year period nearly all winter oat varieties named and released to be grown in the winter oat area of this country were included for 1 or more years in these nurseries. Approximately 110 of the 342 entries grown are named varieties.

Seven varieties, Hairy Culberson, Pentagon, Tech, Winter Turf, Lee, Fulghum, and Appler, C.I. No's. 2505, 2499, 947, 3296, 2042, 708, and 1815,[4/] respectively, were grown in all years, and two varieties, Fulwin and Wintok, C.I. No's. 3168 and 3424, respectively, were grown for 25 years.

Results and Conclusions

Summary data on the years grown, reports included, and survival percentages of winter oats grown for 5 or more years in comparison with the Winter Turf check grown in the same nurseries are presented in table 2.

Table 3 presents similar data on winter oats grown for 1 to 4 years.

For many years few oats appeared more hardy than Winter Turf. This has not been true in recent years. Throughout the 36-year period about 40 percent of the 342 entries have exceeded Winter Turf in survival. The survival records on the 11 most hardy named varieties (survival 120 percent or more of Winter Turf) grown for 2 or more years in 50 or more nurseries are listed in table 4.

The progress in breeding more winter-hardy oats is clearly shown by the comparative survivals of Winter Turf and the 10 most hardy hybrid strains grown for 2 or more years in 50 or more nurseries. Table 5 includes data on these 10 strains, all of which have survived 40 to 50 percent better than the Winter Turf check.

These most hardy hybrid strains all include one or more of the most hardy varieties as parents. This would appear to be a clear indication of the hereditability of winter hardiness in oats and clearly indicates their probable potential as parents to produce still more hardy progenies.

4/ C.I. refers to accession number of Cereal Crops Research Branch, Crops Research Division, ARS.

Table 1.-States and Provinces, locations, and cooperators supplying data on the survival of winter oats during 1926-62, inclusive

States and Provinces	Number of reports	Locations	Cooperators
Alabama	14	Auburn, Fairhope	E. L. Mayton, H. F. Yates
Arkansas	68	Fayetteville, Jonesboro, Stuttgart	C. R. Adair, Tildon Easley, T. H. Johnston, C. K. McClelland, H. R. Rosen, K. Smith, R. L. Thurman, E. F. Vestal, J. W. White, F. J. Williams, W. J. Wiser
Colorado	4	Akron	F. W. Frazier, G. O. Hinze
Connecticut	2	Ellington	I. K. Bespalow, E. K. Walrath
Delaware	8	Georgetown, Newark	F. D. Blest, F. B. Springer, Jr.
Florida	14	Quincy	R. C. Bond, W. H. Chapman, J. D. Warner
Georgia	82	Athens, Blairsville, Experiment, Tifton	J. E. Bailey, R. P. Bledsoe, Acton Brown, R. R. Childs, J. W. Dobson, Hugh Dozier, C. D. Fisher, H. S. Garrison, U. R. Gore, S. J. Hadden, J. W. Johnson, Harold Loden, D. D. Morey, L. N. Skold
Illinois	40	Alhambra, Brownstown, Carbondale, Urbana	C. M. Brown, D. R. Browning, G. M. Dungan, J. W. Pendleton, Ed Sullivan, J. P. Varra, R. O. Weibel
Indiana	43	Bedford, Evansville, Lafayette, Princeton, Vincennes, Worthington	R. M. Caldwell, L. E. Compton, H. G. Hall, F. L. Patterson, J. F. Schafer
Iowa	8	Ames	K. J. Frey, R. Grindeland, H. C. Murphy
Kentucky	37	Allensville, Hopkinsville, Lebanon, Lexington, Princeton	V. C. Finkner, L. M. Josephson, Randolph Richards, D. A. Reid, J. F. Shane
Louisiana	35	Baton Rouge, Bossier City, Calhoun, St. Joseph	E. C. Bashaw, J. P. Gray, C. B. Haddon, J. A. Hendrix, D. M. Johns, J. Y. Oakes, Sidney Stewart

Table 1.-Continued

States and Provinces	Number of reports	Locations	Cooperators
Maryland	43	Beltsville, College Park	W. S. Becker, F. A. Coffman, Wendell Headley, C. V. Lowther, C. B. Marcus, R. G. Rothgeb, Roger Smith, J. W. Taylor
Massachusetts	13	Amherst, W. Springfield (Feeding Hills)	I. K. Bespalow, W. A. Rosenau, E. K. Walrath
Mississippi	100	Holly Springs, Scott, State College, Stoneville, West Point	T. F. Akers, B. L. Arnold, D. H. Bowman, R. B. Carr, S. C. Clapp, J. M. Green, P. W. Gull, G. F. Henry, S. S. Ivanoff, J. W. Neely, J. F. O'Kelly, P. G. Rothman, A. D. Smith, A. D. Suttle, H. A. York
Missouri	42	Columbia, Perry County, Pierce City, Sikeston	B. M. King, C. O. Luper, M. E. Michaelson, J. M. Poehlman, Dale Sechler
New Jersey	28	New Brunswick	G. H. Ahlgren, C. S. Garrison, Steve Lund, R. S. Snell, E. L. Spencer, H. B. Sprague
New York	16	Aurora, Caldwell (field), Ithaca, Katola (field), McGowan (field), Mount Pleasant	N. F. Jensen, E. J. Kinbacher, H. H. Love
North Carolina	60	McCullers, Raleigh, Rowan County, Salisbury, Statesville, Swannanoa, Waynesville	E. S. Carr, J. M. Carr, W. H. Chapman, H. R. Clapp, G. M. Garren, T. T. Hebert, J. W. Hendricks, P. H. Kime, G. K. Middleton, C. F. Murphy, J. L. Rand
Ohio	34	Carpenter, Columbus, Germantown, Wooster	W. P. Byrd, V. C. Finkner, James Foster, J. M. Hamill, C. A. Lamb, L. S. Powelson, D. A. Ray

Table 1.-Continued

States and Provinces	Number of reports	Locations	Cooperators
Oklahoma	87	Cherokee, Goodwell, Heavener, Lawton, Lone Grove, Stillwater, Woodward	H. F. Cobb, C. B. Cross, B. C. Curtis, R. G. Dahms, V. C. Hubbard, C. H. Jameson, T. H. Johnston, R. E. Odom, W. M. Osborn, A. M. Schlehuber, J. B. Sieglinger, G. W. Statton, Edmund Stephens, O. C. Terry
Oregon	22	Astoria, Corvallis, Moro	R. E. Fore, W. E. Hall, D. D. Hill, H. B. Howell, Roderick Sprague
Pennsylvania	22	Centre Hall, Clearfield, Lancaster, Landisville, State College (University Park)	C. S. Bryner, F. A. Coffman, E. A. Hockett, H. G. Marshall, R. P. Pfeifer
South Carolina	99	Blackville, Chester, Clemson, Columbia, Florence, Hartsville, Westminister, York	T. S. Buie, W. P. Byrd, R. B. Carr, R. S. Cathcart, H. P. Cooper, R. W. Earhart, E. B. Eskew, S. J. Hadden, E. E. Hall, R. W. Hamilton, H. F. Harrison, J. H. Hoyert, J. A. Keaton, G. B. Killinger, J. W. Neely, W. R. Paden, B. E. G. Prichard, J. J. Stanton, R. W. Wallace, H. W. Webb, G. J. Wilds
Tennessee	72	Columbia, Crossville, Greenville, Jackson, Knoxville, Springfield	J. Adams, J. J. Bird, E. J. Chapman, E. S. Chapman, J. A. Ewing, N. I. Hancock, B. P. Hazelwood, L. R. Neal, J. A. Odom, J. N. Odom, H. P. Ogden, E. L. Smith Lester Weakley

Table 1.-Continued

States and Provinces	Number of reports	Locations	Cooperators
Texas	123	Amarillo, Bushland, College Station, Denton, Greenville, Howe, Temple	I. M. Atkins, P. B. Dunkle, Henry Dunlavy, A. M. Ferguson, J. H. Gardenhire, H. O. Hill, D. R. Hooten, C. H. McDowell, E. S. McFadden, H. C. McNamara, G. T. McNess, P. C. Mangelsdorf, D. D. Porter, K. B. Porter, H. E. Rea, D. A. Reid, G. W. Rivers, D. E. Weibel, R. E. Wester
Virginia	60	Arlington, Blacksburg, Glade Spring, Stauton	W. S. Becker, F. A. Coffman, Horace Garth, P. T. Gish, M. S. Kipps, R. W. Perkins, C. W. Ryburn, E. Shulkcum, T. M. Starling, Frank Stevenson, J. W. Taylor, R. E. Wester
Washington	15	Battle Ground, Mount Vernon, Pullman, Puyallup	O. E. Barbee, Karl Baur, M. S. Grunder, H. E. Harndon, W. Perry
West Virginia	43	Kearneysville, Lakin, Morgantown, Reedsville, Wardensville	C. J. Cunningham, T. C. McIlvaine, G. G. Pohlman, B. C. Ritter, Collins Veatch, J. W. Taylor, R. O. Weibel
Canada:			
B. C.	13	Cobble Hill, Duncan, Nanaimo, Saanichton	R. H. Turley
Ontario	2	Harrow	G. H. Clark

Table 2.-Summary data on the survival of winter oats in comparison with Winter Turf check grown 5 or more years in the Uniform Winter Hardiness Nurseries

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
6980	Ballard	8	243	71.2	135.6
5364	Nysel	10	279	71.0	131.0
6903	Norline	5	145	69.5	130.6
6572	Dubois	9	250	69.5	126.1
3424	Wintok	25	1071	77.2	121.5
5106	Cimarron	7	171	72.1	120.6
5368	Clinton x Hairy Culberson	6	141	73.5	118.9
3168	Fulwin	26	1111	74.0	116.5
5118	Colwin	5	121	75.2	114.8
3170	Forkedeer	5	126	72.1	109.7
3218	Bicknell	25	562	75.4	108.5
3169	Tennex	5	135	77.4	108.4
2505	Hairy Culberson	36	1249	69.7	107.7
2499	Pentagon	36	1249	69.5	107.4
273	Culberson	10	138	72.3	105.9
3175	Fulghum (Winter Type)	5	118	75.2	105.2
947	Tech	36	1249	68.0	105.1
748	Dwarf Culberson	6	59	71.1	104.6
2506	Sporen	8	139	74.7	103.8
3430	Markton x Red Rustproof	5	135	73.6	103.1
3026	Norton x Navarro	5	109	76.3	102.9
2500	Winter Fulghum	5	58	56.9	102.3
4660	Mustang	5	150	68.3	101.9
3427	Pioneer	5	144	72.8	101.8
2498	Winter Fulghum	14	268	70.6	100.7
2041	Custis	10	138	68.6	100.4
3232	Winter Fulghum	6	94	74.2	100.1
3296	Winter Turf (Check)	36	1249	64.7	100.0
3295	Winter Turf	10	138	67.9	98.8
3392	Letoria	13	371	68.0	98.4

Table 2.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
3217	Culred	10	138	67.2	98.4
3179	Markton x Red Rustproof	7	173	66.8	97.4
2042	Lee	36	1249	62.6	96.8
844	Ferguson No. 71	8	96	69.0	96.5
775	Red Rustproof	6	59	64.3	94.6
2462	Hasting	9	133	63.5	92.3
3422	New Nortex	5	135	65.5	91.7
2382	Nortex	11	185	63.7	90.6
2150	Ferguson No. 922	10	155	66.0	89.2
3923	De Soto	5	139	57.5	82.7
3531	Fultex	12	347	53.8	78.8
708	Fulghum	36	1249	50.1	77.4
4313	Carolina Red	8	228	52.9	75.8
1815	Appler	36	1249	48.9	75.6
3733	Rangler	5	136	50.0	74.3
7125	Victorgrain 48-93	5	160	34.7	68.8
2766	Alber	5	100	47.1	65.3

Table 3.-Summary data on the survival of winter oats in comparison with Winter Turf check grown for 1 to 4 years in the Uniform Winter Hardiness Nursery

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
7482	Hairy Culberson x Nysel	1	36	80.2	150.8
7490	Nysel x Hairy Culberson	2	64	76.4	149.5
7491	------do	1	36	79.1	148.7
7489	------do	2	64	75.5	147.7
7496	Cimarron x [(Hajira x Joanette) x (Atlantic x Clinton^2-Santa Fe)]	2	64	75.2	147.2
7495	Cimarron x [(Hajira x Joanette) x (Atlantic x Clinton^2-Santa Fe)]	2	64	75.0	146.8
7746	Nysel x Hairy Culberson	1	28	71.0	146.4
7300	Dubois x Nysel	3	98	71.0	145.8
7410	Wintok x Dubois	2	67	66.5	144.9
7414	Hairy Culberson x Nysel	1	31	54.3	144.8
7412	(Wintok x Hairy Culberson) x (Hairy Culberson x Nysel)	1	31	54.1	144.3
7494	Hairy Culberson x Nysel	1	36	76.3	143.4
7301	(Hairy Culberson x Nysel) x Early Wintok	2	62	65.9	143.3
7492	Hairy Culberson x Nysel	1	36	76.2	143.2
7748	------do	1	28	69.4	143.1
7497	Wintok x (Clinton x Hairy Culberson)	1	36	76.1	143.0
7493	Hairy Culberson x Nysel	1	36	76.0	142.9
5849	Wintok: Early Sel.	2	57	82.1	142.8
7747	Nysel x Hairy Culberson	1	28	68.5	141.2
7302	Hairy Culberson x Nysel	2	62	64.9	141.1
7481	------do	3	91	78.0	140.8
7411	(Hairy Culberson x Nysel) x Dubois	1	31	52.5	140.0
7485	Wintok x (Lee-Victoria x Fulwin)	1	36	73.7	138.5
7749	Hairy Culberson x Nysel	1	28	66.6	137.3
7131	Wintok x Lee	1	30	69.0	136.9
7762	Ballard x ‖(Landhafer x Clinton^4) x ‖Osage x [(Bonda x Hajira-Joanette) x Santa Fe]‖‖	1	28	66.4	136.9
7753	Dubois x Nysel	1	28	66.3	136.7

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
7620	(Cimmaron x Hajira-Joanette) x (Atlantic x Clinton^{2}-Santa Fe)	2	55	77.1	136.2
7763	Ballard x][(Landhafer x Clinton^{4}) x][Osage x [(Bonda x Hajira-Joanette) x Santa Fe]][]	1	28	66.0	136.1
7761	Ballard x][(Landhafer x Clinton^{4}) x][Osage x [(Bonda x Hajira-Joanette) x Santa Fe]][]	1	28	65.9	135.9
7215	Fulwin x Wintok	4	130	68.5	135.5
7483	Traveler 1 x Bicknell	2	63	78.8	135.2
7603	Excel	2	55	76.5	135.2
7408	Wintok x (Clinton x Hairy Culberson)	2	58	67.7	134.3
7484	Wintok x (Lee-Victoria x Fulwin)	2	63	78.1	134.0
7298	(Fulwin x Wintok) x (Traveler x Red Rustproof-Victoria)	2	62	61.6	133.9
7299	Wintok x Stanton	2	62	61.5	133.7
7480	Wintok Selection x Hairy Culberson	2	63	77.8	133.4
7407	Wintok x (Clinton x Hairy Culberson)	1	31	50.1	133.4
7297	(Red Rustproof x Victoria-Richland) x Lee	2	62	61.1	132.8
7223	Hairy Culberson x Nysel	1	32	73.1	131.2
7409	Wintok x (Clinton x Hairy Culberson)	3	86	64.7	129.9
7406	(Fulwin x Wintok) x [(Red Rustproof x Victoria-Richland) x Lee]	2	58	64.7	128.4
7760	Ballard x Schumaker	1	28	62.3	128.4
7751	(Hairy Culberson x Nysel) x Dubois	1	28	61.8	127.4
7602	M.B. 59	1	27	82.8	127.2
5848	(Lee x Victoria) x Forkedeer^{2}	1	29	61.8	126.9
7618	Wintok x (Clinton x Hairy Culberson)	1	27	82.6	126.9
7221	Advance x Nysel	2	63	69.8	126.7
7132	[Traveler x (Red Rustproof x Victoria-Richland)] x (Fulwin x Wintok)	3	93	67.8	126.5
7216	(Fulwin x Wintok) x [(Red Rustproof x Victoria-Richland) x Lee]	2	63	69.1	125.4
7129	Wintok x Atlantic	3	93	66.8	124.6

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
7303	Dubois[7] x Landhafer	2	62	56.7	123.3
7764	Ballard x ‖Victorgrain x [(Bonda x Hajira-Joanette) x Santa Fe]‖	1	28	59.7	123.1
6982	Clinton x Forkedeer	1	28	65.4	122.9
7767	Wintok x Victorgrain 48-93	1	28	59.3	122.3
7752	Dubois x Nysel	1	28	59.2	122.1
7214	Wintok x Lee	2	63	67.1	121.8
7130	Wintok x Atlantic	2	62	64.5	121.5
6902	Stanton Strain	2	51	69.8	121.4
6981	Forkedeer (Cold treated)	2	58	62.7	121.0
7619	Wintok x (Clinton x Hairy Culberson)	1	27	78.8	121.0
7507	Ballard x ‖(Landhafer x Clinton[4]) x ‖Osage x [(Bonda x Hajira-Joanette) x Santa Fe]‖‖	1	27	83.2	120.9
7754	Wintok Selection x Hairy Culberson	1	28	58.6	120.8
6727	Clinton x Forkedeer	3	62	73.5	120.7
6571	Bronco	3	62	80.9	120.4
7222	Nysel x Craig	2	63	65.7	120.1
7621	Traveler 1 x Bicknell	1	27	82.6	120.0
7487	Forkedeer x [(Hajira-Joanette x Bond-Rainbow) x Santa Fe]	1	36	63.7	119.7
7352	Forkedeer x [(Hajira-Joanette x Bond-Rainbow) x Santa Fe]	1	36	63.6	119.5
7486	Cimarron x Traveler	1	36	63.6	119.5
7622	Ballard Early Selection	1	27	77.8	119.5
6728	Clinton x Forkedeer	2	34	80.2	119.2
6901	(Lee x Victoria) x Fulwin	2	51	68.0	118.3
6905	Ballard Selection	4	112	70.8	118.0
7217	Fulwin x Victorgrain	1	32	65.7	118.0
7135	Wintok x Atlantic	1	32	65.5	117.6
6988	Cimarron x Traveler	2	58	60.8	117.4
6573	(Fulwin x Lee-Victoria) x Tennex	3	62	78.6	117.3

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
7296	(Fulwin x Wintok) x (Traveler x Red Rustproof-Victoria)-----	1	31	64.0	116.8
5369	Clinton x Forkedeer----------	3	79	72.8	116.7
6717	(Lee x Victoria) x Fulwin----------	2	34	78.4	116.5
7758	Arlington x Wintok----------	1	28	56.5	116.5
6983	(Clinton x Forkedeer) x (Wintok x Ark. 674)----------	2	58	60.2	116.2
5874	Fulwin x (D69 x Bond)----------	1	28	77.4	116.0
7128	Cimarron x Traveler----------	2	62	60.9	114.9
6989	------do----------	2	58	58.9	113.7
7601	Ballard x [Victorgrain x [(Bonda x Hajira-Joanette) x Santa Fe]]----------	1	27	71.9	110.4
7768	LeConte x (Wintok Sel. x Hairy Culberson)----------	1	28	53.2	109.7
4204	Fulwin x (Lee x Victoria)----------	1	30	56.1	109.6
7609	(Clinton[6] x Landhafer) x Wintok----------	2	55	61.0	107.8
4828	Woodward Sel. Pl. 3----------	2	60	80.0	107.2
7404	Arkwin Selection----------	1	31	40.2	107.2
7608	(Clinton[6] x Landhafer) x Wintok----------	2	55	60.6	107.1
5850	Arkwin----------	2	34	72.0	107.0
5107	LeConte----------	3	82	63.6	106.8
5108	Pentagon----------	2	53	76.6	106.8
7127	Forkedeer x Fulgrain Strain 6----------	1	30	53.7	106.5
6984	(Clinton x Forkedeer) x (Wintok x Ark. 674)----------	3	90	52.1	105.8
7611	Dubois x (Dubois Sib.[2] x Landhafer)----------	2	55	59.7	105.5
4207	Fulghum x Winter Turf----------	1	30	53.9	105.3
7765	[(Red Rustproof x Victoria-Richland) x (Lee-Victoria x Fulwin)] x (Clinton[2] x Santa Fe)----------	1	28	51.0	105.2
6979	Fulgrain Strain 6 x Forkedeer----------	1	28	55.5	104.3
2504	Coker 7a1-20-5-3----------	2	19	53.8	103.9
6904	(Lee x Victoria) x Forkedeer[2]----------	2	53	57.5	103.2
4830	Stanton----------	1	29	82.5	102.9
3252	Winter Turf----------	1	22	85.4	102.3
3180	Support----------	2	53	75.8	102.2

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
3527	Woodward Composite	2	53	76.8	101.5
3426	(Winter Turf x Aurora) x Culred	2	55	74.0	101.4
3747	Fulghum x Victoria	1	29	59.3	101.4
4834	Fulwin x (Tennex X Bond)	4	111	68.5	100.9
4663	(Hancock x Morota-Bond) x Wintok	3	99	73.1	100.7
4599	Atlantic	2	68	74.0	100.1
6722	(Lee-Victoria x Fulwin) x (Clinton^2 x Santa Fe)	1	11	76.9	99.9
3696	Lee x Fulghum	2	58	65.2	99.7
4545	Radford	1	32	68.6	99.6
5367	Foundling	1	22	74.8	99.6
7617	(Clinton x Hairy Culberson) x (Dubois Sib.^{2} x Landhafer)	2	55	56.4	99.6
3431	Fulghum x Winter Turf	3	77	75.6	99.5
4549	Boliver	1	32	68.4	99.3
1450	Red Rustproof	1	5	56.6	99.1
7616	(C4611-4-4-2^2 x Wintok-Ark. 674) x R392A2-31-2	2	55	56.1	99.1
2684	Burt	3	56	80.4	98.5
3524	Hairy Culberson x Fulghum	1	24	78.5	98.2
2502	Arkansas Sel. 160	4	48	73.6	98.1
3855	Stanton	3	90	62.2	98.0
4550	(Lee x Victoria) x Fulwin	1	32	67.5	98.0
3393	Lenoir	2	53	74.0	97.8
4203	Pentagon x Victoria	1	30	50.0	97.7
7607	Arlington x Cleo	1	27	63.6	97.7
3432	Fulghum x Custis	2	53	71.8	96.8
3176	Big Boy x Navarro	3	64	68.1	96.5
3694	Lee x Victoria	2	58	63.1	96.5
3425	Lee x Fulghum	3	84	69.9	96.1
2503	Red Rustproof	3	29	62.9	95.9
5366	Colo x Wintok	1	22	72.0	95.9
3253	Fulgrain	3	77	72.5	95.4
7126	LeConte x Fulgrain Strain 6	1	30	48.0	95.2

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
3414	Hairy Culberson x Victoria	2	53	71.7	94.7
6583	(Lee-Victoria x Fulwin) x (Clinton^2 x Santa Fe)	1	11	72.9	94.7
6724	Fultex x Santa Fe	1	11	72.9	94.7
7757	(Arlington x LMHJA) x [(Letoria x Clinton^2-Santa Fe) x Arlington]	1	28	45.8	94.4
4383	Fulwin x (Lee x Victoria)	2	50	68.4	94.0
7606	Arlington x Cleo	1	27	61.1	93.9
4654	Stanton	1	39	65.3	93.8
2910	Norton Big Boy	3	56	76.2	93.7
4547	Bristol	1	32	64.5	93.6
7755	Arlington x Cleo	1	28	45.3	93.4
3695	Lee x Bond	2	58	61.0	93.3
3178	Markton x Red Rustproof	2	38	57.8	93.1
4317	Seg. X35DV x Hairy Culberson	1	28	66.5	93.1
7614	(C4611-4-4-2^2 x Wintok-Ark. 674) x R392A2-31-2	2	55	52.7	93.1
2909	Norton (Strain No. 3)	3	56	75.3	92.6
3413	Hairy Culberson x Victoria	1	31	62.6	92.6
3523	Red Rustproof x Winter Turf	1	24	73.9	92.5
6720	Wintok x (Clinton^2 x Santa Fe)	1	11	70.8	91.9
7612	(Dubois^6 x Landhafer) x (Forkedeer^2 x Lee-Victoria)	2	55	52.0	91.9
4543	Stanton Strain 3	1	32	63.0	91.4
4833	Fulghum (Winter Turf) x (Bond x Iogold)	2	60	68.0	91.2
2501	Norton	1	9	77.8	91.0
4206	Traveler 1	1	32	62.5	90.7
6736	Atlantic x (Clinton^2 x Santa Fe)	1	23	56.4	90.0
4316	(Lee x Victoria) x Fulwin	3	78	64.8	89.6
5109	Fulwin x (Victoria x Hajira-Banner)	1	31	60.1	89.6
6907	Santa Fe x (Stanton x Fulgrain)	1	23	56.2	89.6
5121	Anderson	1	22	67.2	89.5
7605	(Arlington x LMHJA) x (Letoria x Clinton^2-Santa Fe)	1	27	58.1	89.2
3725	Red Rustproof^2 x (Victoria x Richland)	1	29	52.1	89.1

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
3693	Fulgrain Strain 4	2	58	58.2	89.0
3423	Fulgrain Strain 2	1	31	59.8	88.5
7220	Arlington x Cleo	2	63	49.5	88.4
6740	Cleo	2	51	50.8	88.3
6906	Victorgrain 48-93	1	23	55.3	88.2
6723	Victorgrain 48-93	1	11	67.6	87.8
7133	Atlantic x (Clinton^{2} x Santa Fe)	1	30	44.2	87.7
5113	Tennex x (Victoria x Hajira-Banner)	1	31	58.7	87.6
4219	Fulwin x (Lee x Victoria)	1	28	62.5	87.5
5111	Fulwin x (Victoria x Hajira-Banner)	1	31	58.5	87.3
4080	Lemont	2	70	64.8	87.2
5112	Fulwin x (Victoria x Hajira-Banner)	1	31	58.4	87.2
3692	Victorgrain	3	89	61.1	86.7
7413	Roanoke	1	31	32.5	86.7
4551	(Lee x Victoria) x Fulwin	1	32	59.6	86.5
4657	Arlington	2	68	63.9	86.2
3433	Lee x Victoria	1	22	71.9	86.1
3944	Lee x Victoria	1	31	68.6	85.6
7613	(C4611-4-4-2^{2} x Wintok-Ark. 674) x R392A2-31-2	1	27	55.6	85.4
4078	Quincy Gray (Quincy 2)	1	31	68.3	85.3
3380	Lee x Victoria	1	31	57.4	84.9
7600	Ballard x ⟦(Landhafer x Clinton^{4}) x ⟦Osage x [(Bonda x Hajira-Joanette) x Santa Fe]⟧⟧	1	27	55.3	84.9
5365	Carolina Red Strain 2	1	22	63.7	84.8
4381	Fulwin x (Lee x Victoria)	1	18	67.5	84.6
3535	Nortex x Victoria	2	58	55.1	84.3
4382	Fulwin x (Lee x Victoria)	2	50	60.9	83.7
3398	Leroy	3	77	60.0	83.6
4390	Stanton Strain 2	1	18	66.6	83.5
4315	Stanton	1	28	59.5	83.3
7756	(Arlington x LMHJA) x Arlington	1	28	40.4	83.3

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
6576	Atlantic x (Clinton^2 x Santa Fe)	1	28	55.5	83.2
4832	Victorgrain	1	29	66.6	83.0
3526	Tift	2	44	64.3	82.9
3384	Levic	1	31	66.0	82.4
4659	Letoria Strain 6	2	68	60.7	81.9
3404	Lelina	2	61	53.9	81.8
4318	Victoria x Norton	2	46	60.0	81.1
5356	Fulgrain	1	22	60.5	80.6
7610	(Clinton^6 x Landhafer) x Wintok	1	27	52.5	80.6
6725	Santa Fe x (Stanton x Fulgrain)	1	11	62.0	80.5
4651	Anderson	3	99	58.4	80.4
4835	[Red Rustproof x (Victoria x Richland)] x (Lee-Victoria x Fulwin)	2	60	60.0	80.4
6604	Atlantic x (Clinton^{2}x Santa Fe)	1	11	61.9	80.4
4380	Winter Fulghum x Bond	1	18	64.0	80.2
3167	Fulghum x Navarro	2	42	48.9	80.0
7405	Letoria x (Clinton^2 x Santa Fe)	1	31	30.0	80.0
4658	(Lee x Victoria) x Fulwin	1	39	55.5	79.7
3754	Rustler	2	60	54.7	78.5
5355	Victorgrain 48-93	2	57	45.6	78.1
6525	Clinton x Santa Fe	1	28	52.0	78.0
4205	Fulgrain Strain 6	2	58	47.5	77.9
4076	Fulghum x Bond	2	61	51.3	77.8
6578	(Bond x Fulghum) x Victorgrain	1	28	51.9	77.8
7766	Seminole x Fulwin	1	28	37.6	77.5
5353	Victorgrain	1	22	58.0	77.3
4652	Taggart	2	68	57.1	77.1
6726	Carolina Red x Landhafer	1	11	49.3	77.0
7509	Sumter	3	91	42.6	77.0
4553	Red Rustproof^2 x (Victoria x Richland)	1	32	52.7	76.5
6986	Victorgrain 48-93	1	28	40.6	76.3

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
3417	Ranger	4	114	51.1	76.1
4208	Lee x Victoria	1	30	38.6	75.4
4098	Victorgrain	1	30	38.4	75.0
4314	Victorgrain Strain 4	1	28	53.3	74.6
3379	Lega	3	89	49.7	73.5
3525	Nortex x Victoria	2	35	51.8	72.7
6985	Atlantic x (Clinton^2 x Santa Fe)	1	28	38.7	72.7
7604	Nysel x Torch	1	27	47.0	72.2
4831	Fulgrain	1	29	57.5	71.7
5117	Sturdy	1	31	49.2	71.0
5381	(Fulwin x Lee-Victoria) x Bonda	1	29	34.6	71.0
7134	(Trispernia x Clinton^2-Santa Fe) x (Atlantic x Clinton^2-Santa Fe)	1	30	35.7	70.8
5114	Victorgrain	1	31	48.9	70.6
5115	Fulgrain	1	31	48.9	70.6
6719	(Victoria x Hajira-Banner) x (Fulghum x Victoria)	2	34	47.5	70.6
4388	Victorgrain Strain 5	2	50	51.2	70.3
6579	Appler x Trelle Dwarf	1	28	46.8	70.2
6908	(Arlington x Delair) x Trispernia	1	23	43.6	69.5
7294	(Arlington-Delair x Trispernia) x Woodgrain	1	31	37.3	68.4
4077	Quincy Red (Quincy 1)	3	89	46.1	68.2
6577	(Bond x Fulghum) x Victorgrain	1	28	45.5	68.2
5370	(D69 x Bond) x Fultex	1	22	51.0	67.9
7626	Arlington "Off type"	1	27	44.1	67.7
6580	Trispernia x (Clinton^2 x Santa Fe)	1	28	35.6	66.7
4653	Delair	2	68	49.1	66.4
3955	Red Rustproof x (Victoria x Richland)	2	61	43.4	65.9
7143	Tennex x (Victoria x Hajira-Banner)	1	32	36.2	65.0
7615	(C4611-4-4-2^2 x Wintok-Ark. 674) x R392A2-31-2	1	27	42.3	65.0
4544	Lega 16	1	32	44.4	64.4
4552	Red Rustproof^2 x (Victoria x Richland)	1	32	44.4	64.4

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival: Weighted average (Pct.)	Survival: Compared with Winter Turf (Pct.)
6721	Winter Turf x (Clinton^2 x Santa Fe)	1	11	49.5	64.3
3752	Nortex x Victoria	1	30	32.5	63.5
4385	Red Rustproof^2 x (Victoria x Richland)	2	50	46.1	63.3
7219	Victorgrain 48-93 x [(Bonda x Hajira-Joanette) x Santa Fe]	1	32	34.7	62.3
7403	(Fulgrain 3 x Suregrain) x [(Victorgrain^2 x Bond-Fulghum) x Surgrain]	1	31	23.1	61.6
5471	Winter Turf x (Clinton^2 x Santa Fe)	1	29	29.8	61.2
6994	Tennex x (Victoria x Hajira-Banner)	1	32	33.9	60.9
7229	Moregrain	1	31	33.0	60.6
6987	(Arlington x Delair) x Trispernia	1	28	32.2	60.5
4000	(Fulghum x Markton) x (Victoria x Richland)	1	31	48.1	60.0
4661	Red Rustproof^2 x (Victoria x Richland)	2	68	44.3	59.8
4557	Victorgrain Strain 6	1	39	41.4	59.5
5380	(Fulwin x Lee-Victoria) x Bonda	1	29	29.0	59.5
5847	Fulgrain	1	29	29.0	59.5
5371	Alamo	1	22	44.1	58.7
4095	(Nortex x Victoria) x (Richland x Fulghum)	2	58	35.4	58.0
4655	Fulgrain	1	39	39.7	57.0
7759	Ballard x LMHJA	1	28	28.5	56.7
7239	Victorgrain 48-93 x [(Bonda x Hajira-Joanette) x Santa Fe]	1	31	30.9	56.4
4386	Red Rustproof^2 x (Victoria x Richland)	3	89	39.7	55.7
4079	Camellia	3	89	37.2	55.0
5497	Atlantic x (Clinton^{2}x Santa Fe)	1	29	26.7	54.8
2733	Bond	2	36	42.5	54.6
4389	Fulgrain Strain 7	1	18	43.2	54.1
5352	(Red Rustproof x Victoria-Richland) x Fultex	1	29	25.4	51.7
4662	Red Rustproof^2 x (Victoria x Richland)	1	39	34.5	49.6
7218	(Victorgrain x Fulwood) x (Arlington-Delair x Trispernia)	1	32	26.8	48.1
4384	Red Rustproof^2 x (Victoria x Richland)	1	18	36.2	45.4
5126	Full-Bright	1	22	33.1	44.1
4656	(Iogold x Bond) x Fultex	1	39	29.3	42.1

Table 3.-Continued

C.I. No.	Variety or hybrid and selection	Years grown	Reports included	Survival	
				Weighted average	Compared with Winter Turf
				(Pct.)	(Pct.)
4387	Red Rustproof[2] x (Victoria x Richland)----------	1	18	33.5	42.0
2401	Victoria----------	2	36	31.2	40.9
4827	Red Rustproof x Bond----------	1	29	32.1	40.0
6574	(Hajira-Joanette x Colo-Wintok) x Landhafer----------	1	28	26.3	39.4
6581	Florida 167 x Landhafer----------	1	28	22.2	33.3
4319	(Fulghum x Markton) x (Victoria x Richland)----------	1	28	18.4	25.8

Table 4.-Oat varieties grown for 2 or more years having the highest percentage of survival

C.I. No.	Variety	Years grown	Reports included	Survival: Weighted average	Survival: Compared with Winter Turf
				(Pct.)	(Pct.)
5849	Wintok: Early selection	2	57	82.1	142.8
6980	Ballard	8	243	71.2	135.6
7603	Excel	2	55	76.5	135.2
5364	Nysel	10	279	71.0	131.0
6903	Norline	5	145	69.5	130.6
6572	Dubois	9	250	69.5	126.1
3424	Wintok	25	1071	77.2	121.5
6902	Stanton Strain	2	51	69.8	121.4
6981	Forkedeer (cold treated)1/	2	58	62.7	121.0
5106	Cimarron	7	171	72.1	120.6
6571	Bronco	3	62	80.9	120.4

1/ Forkedeer (C.I. 3170), grown 5 years in 126 nurseries, had an average of 72.1 percent or only 109.7 percent of Winter Turf.

Table 5.-Oat selections grown for 2 or more years that appear superior to Winter Turf check in hardiness by 40-50 percent

Rank	C.I. No.	Parent or cross or selection	Reports included	Survival: Compared with Winter Turf
				(Pct.)
1	7490	Nysel x Hairy Culberson	64	149.5
2	7489	----do	64	147.7
3	7491	Cimarron x (Hajira x Joanette) x (Atlantic x Clinton2-Santa Fe)	64	147.2
4	7495	----do	64	146.8
5	7300	Dubois x Nysel	98	145.8
6	7410	Wintok x Dubois	67	144.9
7	7301	(Hairy Culberson x Nysel) x Early Wintok	62	143.3
8	5849	Wintok: Early selection	57	142.8
9	7302	Hairy Culberson x Nysel	62	141.1
10	7481	----do	91	140.8